Islands. During the 19th and 20th it crossed the two southernmost islands of Japan proper. Late on the 20th it crossed northern Honshu and emerged into the Pacific. Its later course was followed until the 23d, when it lay southeast of the Kuril Islands.

According to press reports, 1,000 fishing boats and 2,000 Japanese fishermen were missing after the devastation of Shikoku Island by the typhoon on the 20th. The Japanese steamer *Yashima Maru* foundered off Suma at this time with 54 out of 107 persons on board reported lost. At sea on the 22d and 23d, gales of force 9 and 10 were reported as accompanying the storm between the Japanese coast and about 165° E.

A depression that appeared east of the Philippines on October 31 caused the loss of a few lives and some damage to property over the Visayas on November 1 or 2.

Fog.—Frequent fog mantled the coastal waters of the United States. From Eureka to San Pedro about 50 percent of the October days had fog. Between Eureka and Vancouver Island and along the west coast of Lower California, it occurred on 30 to 35 percent of the days. For some distance outside this fog belt there were greatly lessened occurrences seaward, and over the great body of the northern routes it occurred on not to exceed 1 or 2 days in the several 5° squares.

TYPHOONS IN THE FAR EAST DURING OCTOBER 1933

By Rev. C. E. DEPPERMANN, S.J.

[Weather Bureau, Manila, P.I., November 1933]

(1) *October 11.*—Although suspected on October 10, this typhoon was not certain until the next day. It was rather low in latitude, on the tropical front between Yap and Palau. Traveling northwest for 2 days until within about 200 miles of mid-Philippines, it then turned north until the 17th. From the 12th on, the tropical front could be distinctly traced on our maps as it progressed northward, but since the southwest monsoon was not strong within the islands, we conclude that it had already been forced out of the center of the typhoon, i.e., the typhoon had occluded very early. This conjecture is strengthened by the fact that the northeast monsoon apparently reached to the Philippines at the time; hence it is probable that the typhoon was now mainly fed by temperature differences between the northeast monsoon and the trade wind. Why did the typhoon take the path it did? Without upper-air data this is difficult to decide, but it was noticed that pressure was decreasing all the time to the northeast and over the Bonins, with rather strong northeast winds right above the Philippines. It is probable that the upper winds recurved in the direction the typhoon took. On the 17th the typhoon suddenly turned to the northwest till it reached the lower Nansei group, and then finally definitely recurved in a northeast direction along the polar front until around north Japan, whence it turned eastward. Even though the typhoon occluded early, there seems apparently to have remained, until the storm was well within Japan, a well-marked front between the northeast monsoon and the trade all the way from the typhoon to near the Philippines, where there seems to have been an interesting junction of the southwest monsoon, the northeast monsoon, and the trade. Since the typhoon kept a course over water until near Japan, where its intensity had already abated, comparatively little damage was reported, except that in Japan an excursion steamer foundered right in sight of port, with the loss of some 40 lives.

(2) *October 14.*—This was a very small typhoon, but with some interesting and instructive features. As the typhoon of October 11, above mentioned, progressed, the tropical front became more in evidence, from the southernmost tip of Indo-China over to mid-Philippines and on to the typhoon. Above this front there were strong northeasterly winds, continuing down the coastline of Indo-China until they reached the end of the coastal range. At this point they met the southwest monsoon. The situation seems ideal for causing vortices. At any rate, near this part of the China Sea a small typhoon did form, and apparently proceeded in the rather unusual direction, southwest, until it reached this southern tip of the coastal range. It then dissipated over land in the interior

(3) *October 23.*—Due to lack of sufficient data, the explanation of the origin of this typhoon is only tentative, but it appears quite plausible. As the typhoon of October 11 moved finally northeast, the front between the northerly winds and the trade progressed slowly but steadily eastward until the typhoon had reached northern Japan. Then the trade started to surge back rapidly. In this way, a secondary probably started at the junction of trade, northeast, and southwest monsoons. This secondary remained as a swift depression until just after it coursed through northern Philippines. Here its further progress was apparently blocked by the southern part of the Asiatic high-pressure area. The quick transition from a speed of about 35 miles per hour to almost nothing was remarkable. Remaining almost stationary for a day, the depression intensified into a true typhoon, and then proceeded comparatively slowly toward Indo-China. Before the depression passed through our islands, the tropical front was in evidence, but no squalls were present to indicate anything alarming.

(4) *October 26.*—This typhoon appears to have been brooding to the southwest of Yap as early as the 25th, at the meeting place of trade and southwest monsoon, but it did not start to move decidedly until the 27th. On the afternoon and evening of the 28th it remained almost stationary, but then started swiftly at the rate of over 30 miles an hour in a west-northwest direction toward the southern Philippines, giving us barely enough time for proper typhoon warnings for the people. Through the islands it still moved quite rapidly, about 20 miles an hour, and then leisurely crossed the China Sea and entered Indo-China. Fortunately the typhoon was only of moderate intensity (these usually move faster than the more intense typhoons), and directly struck land in the Philippines only in a few places. As it was, however, 15 or more lives were lost and quite some property damaged. How about the fronts as the typhoon passed through the islands? This question cannot be answered until all our barograph records have been received from the stations near the typhoon. However, it is quite probable that Father Gherzi and others are correct in stating that close to the center of a typhoon, i.e., in the region of very strong winds in the typhoon proper, no fronts can exist.